time to come, and he has earned the gratitude of all students of the group by its publication. The editors of "Das Tierreich" are to be congratulated on the latest addition to the exceedingly useful series of monographs issued under their direction.

W. T. C.

## OUR BOOK SHELF.

*Incubation, or the Cure of Disease in Pagan Temples and Christian Churches.* By Mary Hamilton. Pp. 223. (London: W. C. Henderson and Son; Simpkin; Marshall, Hamilton, Kent and Co., 1906.) Price 5*s.* net.

"IN the ancient science of divination, four working methods were commonly practised. Revelations of the future were deduced from natural portents, from the flight of birds, from the entrails of sacrificial victims, or from dreams. . . . Incubation was the method by which men sought to entice such dreams." These sentences from the introduction indicate the substance of this work. The book is divided into three parts:—(1) incubation in pagan temples, *e.g.* the cult of Asklepios at Epidauros, Rome, Athens, &c., and at the Oracles, Amphiaraos, and others; (2) incubation in Christian churches during the Middle Ages; and (3) the practice of incubation during modern times in Italy, Austria, Greece, and the Greek islands. Translations are given of the various stele which describe the cures wrought and the methods employed in procuring them. The book forms a useful summary of the subject, valuable both to archæologists and to historians of medicine.

*Manual of Wireless Telegraphy.* By A. F. Collins. Pp. x+232. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1906.) Price 6*s.* 6*d.* net.

THE present writer ventured to suggest, in an article in NATURE a short time ago, that with the publication of a really standard book on any particular branch of electricity the issue of further literature on the same subject should cease. If this recommendation had been adopted the present volume would never have seen the light. It does not profess to be anything more than a manual specially adapted for those who are, or desire to become, wireless telegraph operators. There are already numerous books covering almost identically the same ground, and we are of opinion that the useful information contained in any of them could be much more effectively learnt in an hour's practical instruction. Compared with other books of its kind, it may be pronounced a favourable specimen. The style, though a trifle too American for our taste, is simple, and the diagrams are numerous and clear. The illustrations are also plentiful and well reproduced. A list of stations and ships equipped on the various systems forms a distinct feature of the book, which will probably remain up to date for a few weeks longer. M. S.

*Catalogue of the Lepidoptera Phalaenae in the British Museum.* Vol. vi., Noctuidæ. Pp. xiv+532; pls. xcvi–cvii. (London: Printed by order of the Trustees, 1906.) Price 25*s.*

THE present volume is the third of those devoted to the great family Noctuidæ, and includes the subfamily Cucullianæ, with 111 genera and 693 species, a considerable number of both genera and species being described as new. In addition to the coloured plates there are 172 plain illustrations in the text, generally representing the body and left wings of a specimen, the right wings being denuded of scales to show the neuration. To the right of this again is the outline of the thoracic crest and head in profile, the latter showing an antenna, eye, palpus, &c. The first text figure, however, represents the larva of *Cucullia verbasci.* Opposite p. 2 is a large table, showing the relationship of the genera regarded as belonging to the Cucullianæ with one another. The general arrangement and character of this volume differ little from those which have preceded it. Full tables are given of genera and species, and the descriptions are quite sufficiently long for most practical purposes. Brief notices of larvæ and food plants are added, when known.

It is very creditable to all concerned that this important work should be carried on so steadily, a volume appearing about every two years. It may be interesting to notice the dates of the prefaces of each of the six volumes already published:—Vol. i. (Syntomidæ), September 30, 1898; vol. ii. (Arctiadæ: Nolinæ, Lithosianæ), January 20, 1900; vol. iii. (Arctiadæ: Arctianæ, and Agaristidæ), June 20, 1901; vol iv. (Noctuidæ: Agrotinæ), June 20, 1903; vol. v. (Noctuidæ: Hadeninæ), February 24, 1905; vol. vi. (Noctuidæ: Cucullianæ), November 1, 1906.

*Die meteorologischen Elemente und ihre Beobachtung, mit Ausblicken auf Witterungskunde und Klimalehre.* By Otto Meissner. p. vi+94; with 33 illustrations. (Leipzig u. Berln: B. G. Teubner.)

THIS very useful text-book, intended for higher schools and for self-instruction, forms part vi., vol. ii., of the collection of scientific treatises published by O. Schmeil and W. B. Schmidt. It explains the physical laws necessary for clearly understanding meteorological processes and apparatus, and contains valuable footnotes, together with the derivation of all technical terms employed in the text. Many points, such as the difference between periodical and non-periodical oscillations of meteorological elements, "variability" of temperature, the use of the cloud-mirror, &c., which are frequently puzzling to observers, and are generally only dealt with in treatises of greater pretensions, are made quite clear by means of examples. We recommend the perusal of the work to any meteorological students who are acquainted with the German language.

*The Treatment of Diseases of the Digestive System.* By Prof. Robert Saundby. Pp. viii+133. (London: Charles Griffin and Co., Ltd., 1906.) Price 3*s.* net.

THIS unpretentious little book will serve to bring before the practitioner the salient points in the diagnosis and treatment of diseases of the digestive tract. The dose of bismuth in many cases might be larger; useful drugs such as salol, bismuth salicylate, and ipecacuanha are not mentioned; and no precautions are detailed in the use of thymol in ankylostomiasis. Otherwise the teaching throughout seems to be sound and commonsense.

*The Plants of New South Wales.* By W. A. Dixon. Pp. xxxiv+322. (Sydney: Angus and Robertson, 1906.) Price 6*s.* net.

THIS is a handy little book providing a compact guide for naming flowers in the field by means of analytical tables on similar lines to Gremli's well-known flora of Switzerland, but localities are omitted. The author lays stress on the extensive use made of vegetative characters for identification, with which there can only be entire agreement so long as the characters are determinative.

While a condensed guide of this kind is of the greatest service for carrying about, sooner or later the botanist is sure to require a flora giving fuller

descriptions. The author has prepared for this contingency by providing references under each genus to the "Flora Australiensis" and the "Flora of New South Wales," and has arranged his system and nomenclature according to the last named. Ferns and fern allies are included, but of monocotyledons the families of rushes, sedges, and grasses are left out.

## LETTERS TO THE EDITOR.

*[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.]*

### Magnetic Storm and Aurora on February 9-10.

A MAGNETIC storm was recorded at the Kew Observatory (National Physical Laboratory) on the afternoon of February 9 and early morning of February 10 larger than any that has occurred since October 31, 1903. The curves were slightly disturbed during the whole of February 9, but the storm may be regarded as commencing with a rapid movement of a few minutes of arc in the declination needle at 2.15 p.m., with a synchronous sudden rise of 45 $\gamma$ (1 $\gamma$=0·00001 C.G.S.) in the horizontal force. The storm lasted an unusually short time, being practically over by 3 a.m. on February 10, but several large rapid movements were recorded. The largest declination movement occurred between 8.19 p.m. and 8.45 p.m. on February 9. During these twenty-six minutes the needle moved 57′ to the west and then 73′ to the east, the extreme westerly position being reached at 8.34 p.m. The most easterly position during the storm was reached at about 10.55 p.m., when the trace was off the sheet for a few minutes. The range during the storm actually shown on the sheet was 1° 38′. Between 1.13 a.m. and 1.45 a.m. on February 10 the needle moved steadily, without sensible oscillation, to the west, this movement reaching 1°. The rate of movement was practically uniform from 1.13 a.m. to 1.33 a.m., when it accelerated so suddenly that the curve resembles two straight lines inclined at a finite angle.

In the case of the horizontal force, the force fell more than 355 $\gamma$ between 8.25 p.m. and 8.33 p.m. on February 9, when it went off the sheet for a few minutes. Between 8.40 p.m. and 8.49 p.m. it increased fully 240 $\gamma$. The total range during the storm exceeded 480 $\gamma$.

The vertical force, though less disturbed than the other elements, showed a range of 325 $\gamma$, the highest and lowest values being attained at 6.25 p.m. on February 9 and 1.48 a.m. on February 10 respectively. The most rapid change took place between 8.25 p.m. and 8.42 p.m. on February 9. The storm was doubtless associated with the aurora, which seems to have been widely observed on the evening of February 9. CHARLES CHREE.

AN unusually beautiful display of aurora borealis was seen here (51° 56′ N. lat., 2° 35′ W. long.) between 6.30 p.m. and 11 p.m. on Saturday evening, February 9. At about 6.30 p.m. I became aware that the north-western sky, instead of darkening after sunset, was becoming lighter, and the quivering upward rays showed that it was the northern lights. The aurora was at its best between 8 p.m. and 9.30 p.m., stretching half across the northern heavens from Cetus to Leo, from the horizon upwards towards the zenith, some of the curved flashes reaching to Jupiter.

This aurora was characterised by the brilliant soft whiteness of its light, occasionally tinged with pale green, which filled the north-western and northern sky from the horizon to a considerable elevation, from which at times long rays shot up; but more generally the lights appeared as curved, wavy bands rushing up to the zenith, and hanging there for a few seconds as white, cloudy patches in the clear sky among the brighter stars. Between 8.45 p.m. and 9.15 p.m. the colour about Ursa Major and Leo was a dull, faint red. The aurora was not watched after 11 o'clock, but by that time it had greatly diminished in brilliancy, and the sky was becoming cloudy.

I may add that for some weeks I have been noting the sun-spots, of which lately there have been a considerable number, and on the morning of February 9 one near the middle of the sun's disc was so large that I afterwards saw it with the naked eye through smoked glass.

E. A.

Dadnor, near Ross, Herefordshire, February 11.

### The Flight of an Elongated Shot.

WOULD any reader of NATURE kindly enlighten me on the following points in the theory of projectiles?

(1) Whether one is right in supposing that a bullet or shot of the modern pointed cylindrical form, when fired at any angle of elevation *in vacuo*, would preserve the original direction of its axis of rotation, so that at the end of its flight its long axis would be considerably inclined to its line of flight.

(2) Whether a similar shot fired through the air would be acted upon by a couple tending to produce rotation about an axis perpendicular to the plane of the trajectory, the magnitude and direction of this couple depending upon the form of the projectile and the position of its centre of gravity, a zero value being possible; and whether the effect of this couple would be to produce rotation about an axis in the plane of the trajectory and perpendicular to the long axis of the shot, so that the point of the projectile would be deflected downwards and to the right or left.

(3) Whether, if the above suppositions are correct, any successful attempts have been made to keep the long axis of the shot tangential to its trajectory during the whole course of its flight, by giving it a particular form, and varying the density of its parts in a particular way.

P. D. STRACHAN.

Philippolis, Orange River Colony.

THE answer to proposition (1) is best given for the most general case. A body projected in any manner in a field of gravity *in vacuo* will move so that the centre of gravity (C.G.) describes a parabola, while the body moves about the C.G. so that to an observer seated at the C.G. the body has the motion described by Poinsot, in which the momental ellipsoid rolls on a fixed plane. The normal to this plane is the axis of resultant angular momentum, and this axis preserves a direction fixed in space, while the body moves about it. When this axis coincides with a principal axis, the body appears to be spinning steadily about the axis, but a closer observation reveals always a precessional and nutational motion.

The question in the limited form of proposition (1) presupposes a body of perfect uniaxial symmetry spun accurately about its axis; but such a condition cannot be realised in practice any more than it is possible to balance a pin on its point, and so it is better to replace this ideal state of proposition (1) by the penultimate state, in which the spinning body, like a sleeping top upright, has steadiness almost perfect.

With this limitation the axis of an elongated shot would move parallel to itself, on the whole, if fired in a vacuum as stated in proposition (1). But if fired in air, as in proposition (2), a couple arises as soon as the axis is oblique to the direction of motion, tending to place the axis of an elongated shot broadside to its motion and at right angles to the tangent of the trajectory, and this couple acting on the rotating shot will cause the axis to precess about the tangent. Even in the absence of air resistance and gravity, the resulting motion is of great complexity where the body is influenced by the stirring up of the surrounding medium, and the special case of a figure of revolution, discussed by Kirchhoff and Clebsch, is more complicated than the gyroscopic motion of a top spinning in a smooth cup.

The problem defies analysis when gravity and air resistance are taken into account: all we can say is that the frictional drag damps the nutation, and causes the axis of the shot to follow the tangent of the trajectory very closely, the point of the shot being seen to be slightly above the tangent and to the right, with a right-handed spin. The conditions of proposition (3) are secured then